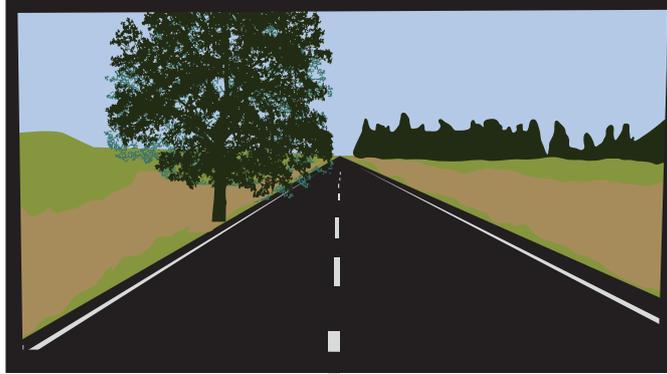


## Task theme Roman Engineering



## Task title How did the Romans make their roads so straight?

### Learning outcomes

- To investigate the impact that the Romans had on Britain.
- To understand the tools Roman engineers used to create straight roads.
- To design and make a Roman groma.

#### EHoM link

#### EDP link



**PROBLEM FINDING**  
Ask pertinent questions to better understand design problems, success criteria and constraints.



**CREATIVE PROBLEM SOLVING**  
Generate and evaluate multiple ideas to help choose optimal solution. Have good people skills to generate ideas collectively.



**SYSTEMS THINKING**  
Construct an object or tool requiring the successful interaction between components and subsystems.



**Key Stage/Year Group** LKS2 – particularly Year 4

## Resources required

It is suggested that children work in pairs and make one groma between them. However, if resources are an issue then it is perfectly possible to work in larger groups.

For each groma you will need the following equipment:

- A dowel rod 60cm – 1m in length
- An A4 piece of grey board, thick cardboard, or 4 large wooden craft sticks
- Glue – either PVA or glue gun
- Paper fasteners
- String
- Objects to add weight: paperclips, Blu Tack, washers etc.

Other equipment

- Heavy duty one-hole punch – to be used by the teacher

[https://www.amazon.co.uk/gp/product/B07N9F5SKP6/ref=ppx\\_yo\\_dt\\_b\\_asin\\_title\\_o05\\_s00?ie=UTF8&psc=1](https://www.amazon.co.uk/gp/product/B07N9F5SKP6/ref=ppx_yo_dt_b_asin_title_o05_s00?ie=UTF8&psc=1)

- Sketch books
- Extra poles for testing – you could potentially use metre rulers for this.

## How to run the task

1. Engage the children by asking them what feats of engineering the Romans were famous for. Collect ideas on Post-It notes or on a whiteboard and display suggestions. Ideas the children may come up with are bridges, baths, underfloor heating and aqueducts. This task is focused specifically on road networks, so support them if they do not volunteer this idea themselves. Guide them in the right direction by clarifying that by engineering you mean things that the Romans built whilst they were in Britain.
2. Stimulate their thinking by showing a map of the Roman roads in Britain: [https://simple.wikipedia.org/wiki/Roman\\_roads\\_in\\_Britain#/media/File:Roman\\_Roads\\_in\\_Britannia.svg](https://simple.wikipedia.org/wiki/Roman_roads_in_Britain#/media/File:Roman_Roads_in_Britannia.svg) and use questioning and some discussion to elicit what they already know about Roman roads. This may vary greatly.
3. If you think it useful you could set a pre-task before the lesson as homework so that the children explore the topic by carrying out some secondary source research.

There are plenty of useful sites on the Internet to use as reference material - <http://www.primaryhomeworkhelp.co.uk/romans/roads.htm>

[http://www.photographers-resource.co.uk/A\\_heritage/Roman/Roman%20roads.htm](http://www.photographers-resource.co.uk/A_heritage/Roman/Roman%20roads.htm)

Another idea is to give the children atlases and ask them to find the roads using the following table:

### Mapping Roman Roads

Name of road	Location
The Fosse Way	Exeter to Lincoln
Stane Street	Chichester to London
Dere Street	York to Scotland
Ermine Street	London to York (via Lincoln)
Akeman Street	St Albans to Cirencester
Watling Street	Richborough to Wroxeter

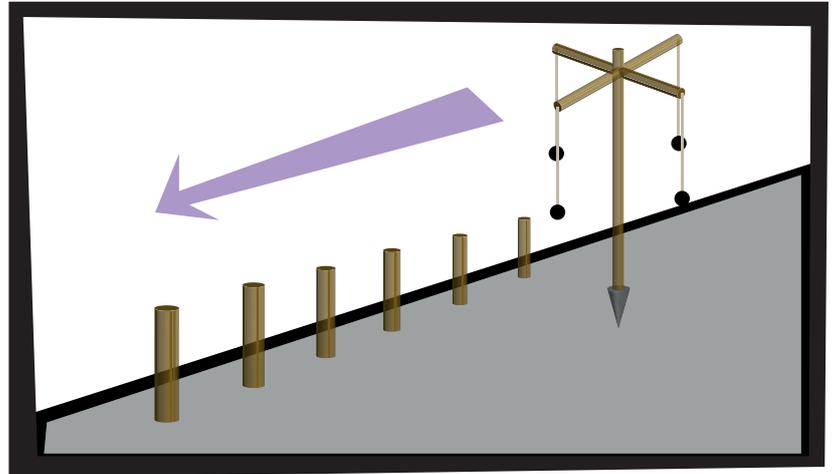
4. Explain that the challenge is to make their own version of an instrument that Roman surveyors used to help keep their roads straight – a wooden cross with weights hanging from it, known as a 'groma'. There is a BBC explanation of gromas and how they work by Adam Hart Davis at: [http://www.bbc.co.uk/history/ancient/romans/tech\\_01.shtml#two](http://www.bbc.co.uk/history/ancient/romans/tech_01.shtml#two)
5. Using the resources suggested above, task the children to design and sketch their own groma. Note they should be paying particular attention to how the different elements join together and how they will weigh down their pieces of string. Encourage the children to think-pair and share their ideas.

6. Depending on your preference, now challenge the children to create their designs – you may choose to do this in pairs or small groups. The children should decide how they are going to fix the different components together. Help may be needed to punch holes or apply hot glue. Provide enough time for the children to make and improve their groma. They should consider how to attach the string effectively and investigate the best objects to use to weigh down the string.

#### TESTING THE GROMAS

7. Once the children have completed their gromas, you can take them outside onto the school field to test. Children should do this in groups of 4 using one of their gromas.

8. One child should choose a point on the field and holding the groma, close one eye and line up the opposite two strings with the central rod. They should then focus on a point in the distance and instruct a member of their group to walk 20 paces with a pole, making sure that the pole lines up with the groma. Once the pole is perfectly lined up, it can be pushed into the ground. This process should then be repeated several times with additional poles until up to 5 posts have been placed and planted.

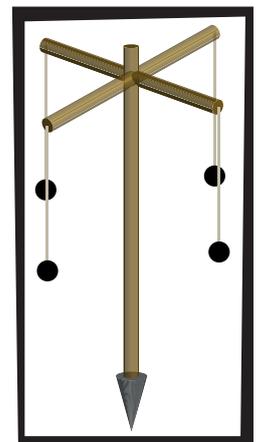


9. To check the accuracy of the posts, take the groma to the end of the line and look down the line. Adjust if necessary.

### Top Tips

**SUPPORT** – to help children with their designs provide them with a diagram of what a groma should look like. They can then choose suitable materials from the available resources.

- Have an example already made for children to refer to if necessary.
- Advise the children that each piece of string should be the same length and have the same amount of weight attached.



### Evaluate learning

- How could the groma be improved? What would the impact be of changing the length of the string? Could different materials be used instead of string?
- Which weights worked best?
- Is there a relationship between the number of paperclips and the length of string?
- What would happen to the accuracy of the equipment if it was very windy? How could you counteract this?

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As a practising teacher, Julie has written these 12 tasks to encourage more children to engage in engineering in primary schools. They have been stimulated by real-world engineering and inspirational ideas shared by others. They are linked to the Tinkering for Learning research and development project run by SEERIH.



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